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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/994,142	11/26/2001	Meijie Zhang	P24,841-A USA	9602

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EXAMINER

DOVE, TRACY MAE

ART UNIT	PAPER NUMBER
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1745

DATE MAILED: 05/03/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/994,142

Applicant(s)

ZHANG, MEIJIE

Examiner

Tracy Dove

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 17 November 2004.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,3-5,7-13,27 and 29-38 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1,3-5,7-13,27 and 29-38 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 26 November 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

This Office Action is in response to the communication filed on 11/17/04. Applicant's arguments have been considered, but are not persuasive. Claims 1, 3-5, 7-13, 27 and 29-38 are pending. Claims 2, 6, 14-26 and 28 are canceled.

Continued Examination Under 37 CFR 1.114

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 11/17/04 has been entered.

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 1, 3-5, 7-13, 27 and 29-38 are rejected under 35 U.S.C. 112, first paragraph, because the specification, while being enabling for a heating temperature in the range of 250°C to 450°C for an aqueous treatment (see Example II), does not reasonably provide enablement for a heating temperature in the range of 250°C to 450°C for a dry treatment. The specification does not enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make or use the invention commensurate in scope with these claims. The specification broadly discloses a heating temperature in the range of 250°C to 650°C. The only disclosure of a heating temperature of 450°C is in Example II for an aqueous treatment.

Claims Analysis

The term "LiCoO₂ type structure" in the claims is defined by the specification at page 3, lines 28-30. A "LiCoO₂ type structure" is defined as LiCoO₂ or LiNi_xCo_{1-x}O₂ ($0 \leq x \leq 1$).

The specification recites the term "lithium borate" is used to refer to any lithium-boron-oxide compound (page 8, lines 1-2).

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1, 3-5, 7-12, 27 and 29-37 are rejected under 35 U.S.C. 102(b)/103(a) as being anticipated by, and alternatively unpatentable over, Uehara et al., JP 09-330720 (a machine translation of the Japanese patent is attached).

Uehara teaches a lithium battery having a positive electrode including a lithium transition metal compound oxide, a negative electrode including a lithium material or a material capable of storing and releasing lithium ion, and a nonaqueous electrolyte. At least part of the particle surface of the lithium transition metal compound oxide is covered with a compound containing

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lithium and boron. Uehara teaches a lithium battery having reduced capacity fade rate (abstract). A multiple oxide containing lithium and boron such as LiBO_2 or $\text{Li}_2\text{B}_4\text{O}_7$ may be used to cover the lithium transition metal compound positive electrode material (0011). The coating compound is contained in an amount of 0.1-20% based on the lithium transition metal compound (0012). The lithium transition metal compound positive electrode material may be $\text{LiNi}_{0.5}\text{Co}_{0.5}\text{O}_2$ (0032). The negative electrode material may be lithium, a lithium alloy or a carbon material such as graphite (0016). The electrode includes an electrolyte salt such as LiPF_6 and an organic solvent such as propylene carbonate, ethylene carbonate, diethyl carbonate, dimethyl carbonate or mixtures thereof (0018-0019). Uehara teaches the lithium transition metal oxide and the lithium-boron-oxide containing compound are mixed and heated to a temperature of 650°C (0039 and 0044). The battery includes a separator 3, as shown in Figure 1. The compound LiCoO_2 is encompassed by the general formula (1) disclosed by Uehara in paragraph 0014. Example 11 in Table 2 teaches $\text{LiNi}_{0.5}\text{Co}_{0.5}\text{O}_2$ with a coating of 2 mol% of LiBO_2 (approximately 1 wt% of LiBO_2).

Thus the claims are anticipated.

The claims are alternatively unpatentable because the courts have ruled that product-by-process limitations, in the absence of unexpected results, are obvious. See MPEP 2113. The heat treatment temperature of Uehara (650°C) is outside of the heat treatment temperature range of the claimed invention (250°C to 450°C). However, the coated positive electrode material of Uehara and the coated positive electrode material of the claimed invention appear to be the same.

Claims 3, 4, 29 and 30 contain product-by-process limitations which are considered obvious in the absence of unexpected results. See MPEP 2113. Specifically, whether the lithium

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borate and lithium insertion compound are dry mixed or mixed in an aqueous solution, the coated lithium insertion compound, as an end result, appears to be the same.

»

Claims 13 and 38 are rejected under 35 U.S.C. 103(a) as being unpatentable over Uehara et al., JP 09-330720 in view of Gosho et al., US 6,589,694.

Uehara teaches a lithium battery having a positive electrode including a lithium transition metal compound oxide, a negative electrode including a lithium material or a material capable of storing and releasing lithium ion, and a nonaqueous electrolyte. At least part of the particle surface of the lithium transition metal compound oxide is covered with a compound containing lithium and boron. Uehara teaches a lithium battery having reduced capacity fade rate (abstract). A multiple oxide containing lithium and boron such as LiBO_2 or $\text{Li}_2\text{B}_4\text{O}_7$ may be used to cover the lithium transition metal compound positive electrode material (0011). The coating compound is contained in an amount of 0.1-20% based on the lithium transition metal compound (0012). The lithium transition metal compound positive electrode material may be $\text{LiNi}_{0.5}\text{Co}_{0.5}\text{O}_2$ (0032). The negative electrode material may be lithium, a lithium alloy or a carbon material such as graphite (0016). The electrode includes an electrolyte salt such as LiPF_6 and an organic solvent such as propylene carbonate, ethylene carbonate, diethyl carbonate, dimethyl carbonate or mixtures thereof (0018-0019). Uehara teaches the lithium transition metal oxide and the lithium-boron-oxide containing compound are mixed and heated to a temperature of 650°C (0039 and 0044). The battery includes a separator 3, as shown in Figure 1. The compound LiCoO_2 is encompassed by the general formula (1) disclosed by Uehara in paragraph

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0014. Example 11 in Table 2 teaches $\text{LiNi}_{0.5}\text{Co}_{0.5}\text{O}_2$ with a coating of 2 mol% of LiBO_2 (approximately 1 wt% of LiBO_2).

Uehara does not explicitly teach that the nonaqueous solvent is a mixture of ethylene carbonate (EC), propylene carbonate (PC), diethyl carbonate (DEC), ethyl methyl carbonate (EMC) and dimethyl carbonate (DMC).

However, Gosho teaches lithium secondary battery having positive electrode including a lithium transition metal composite oxide active material, a negative electrode including a graphite active material and a nonaqueous electrolyte including a salt and a solvent (col. 8, lines 15-48). The lithium transition metal composite oxide is preferably a Li-Co type composite oxide, particularly preferably LiCoO_2 (col. 6, lines 14-23). Table 9 discloses various nonaqueous electrolytes having an LiPF_6 salt and a solvent mixture of EC, PC, DEC, EMC and DMC (Ex. 30-34, 36 and 37).

Therefore, the invention as a whole would have been obvious to one having ordinary skill in the art at the time the invention was made because one of skill would have been motivated to use the organic solvent mixture of Gosho for the organic solvent of Uehara in order to inhibit lowering of discharge capacity and intermediate voltage at low temperature. One of skill would have been motivated to adjust the mixing ratio of the components of the electrolyte solvent to improve low temperature characteristics of the battery (col. 31, lines 65-col. 32, lines 4). Uehara discloses using EC, PC, DEC and DMC as organic solvents for the electrolyte (only EMC is not disclosed by Uehara). One of skill would have been motivated to combine the teaching of Uehara and Gosho because both are directed toward lithium secondary batteries having lithium transition metal oxide positive electrodes and graphite negative electrode. Both references teach

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nonaqueous electrolytes having a LiPF_6 salt and a solvent containing cyclic and linear organic carbonate solvents.

Response to Arguments

Applicant's arguments filed 11/17/04 have been fully considered but they are not persuasive. The 35 U.S.C. 112, 2nd, rejection of claim 5 has been overcome.

Applicant argues Uehara does not anticipated the claimed invention because independent claims 1 and 27 recite a heat treatment temperature range of 250 to 450°C. However, this limitation is not given patentable weight because it is a product-by-process limitation. The courts have ruled that product-by-process limitations, in the absence of unexpected results, are obvious. See MPEP 2113.

Applicant asserts unexpected results are shown in Figure 5 of the present application. However, the results shown in Figure 5 are not commensurate in scope with the claimed invention. Specifically, the results shown are for an aqueous treatment. An aqueous treatment is not required by claim 1 or claim 27. Furthermore, the results shown in Figure 5 are obtained for a specific amount (0.15%) of lithium borate. Claims 1 and 27 do not contain any limitations regarding the amount of lithium borate contained in the cathode powder. Furthermore, unexpected results must distinguish the claimed invention over the prior art. Specifically, Applicant must show the *battery* of the claimed invention has improved capacity fade rate over the *battery* of the prior art.

The 35 U.S.C. 103(a) rejection in view of Uehara and Gosho is maintained. Applicant argues that neither Uehara nor Gosho teach the heating temperature of the claimed invention.

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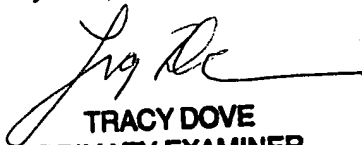
However, the heating temperature is a product-by-process limitation. See arguments above regarding the Uehara reference.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tracy Dove whose telephone number is 571-272-1285. The examiner can normally be reached on Monday-Thursday (9:00-7:30).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Pat Ryan can be reached on 571-272-1292. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).


TRACY DOVE
PRIMARY EXAMINER

April 28, 2005

Best Available Copy